

# Study of Clinicoetiological Correlation in Patient with Neonatal Seizure and Early Outcome

Dhara Gosai<sup>1</sup>, Bela Shah<sup>2</sup>, Nishant Kumar Rai<sup>3</sup>

<sup>1</sup>Assistant Professor, Department of Paediatrics, B. J. Medical College, Ahmedabad.

<sup>2</sup>Professor & Head of Unit, Department of Paediatrics, B. J. Medical College, Ahmedabad.

<sup>3</sup>3<sup>rd</sup> year resident, Department of Paediatrics, B. J. Medical College, Ahmedabad.

Received: December 2019

Accepted: December 2019

**Copyright:** © the author(s), publisher. It is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

## ABSTRACT

**Background:** Seizures are associated with poor neuro developmental outcome if not diagnosed early and treated properly. During newborn period, seizures indicate underlying neurological disease. Neonatal seizures lead to increased morbidity and mortality usually found in neonatal intensive care unit. The objective of this study was to evaluate incidence and outcome of neonatal seizures. **Methods:** Present study was hospital based prospective study conducted among 85 neonates of 0-28 days of age at a civil hospital ahmedabad for a period of 6 month. The data like history, clinical examination and investigation findings was recorded in the pre-designed, pre-tested, semi structured questionnaire.

**Results:** The incidence of neonatal seizures was higher in male neonates. Subtle types of seizures were the commonest type of seizures. The incidence of neonatal seizure are more in term neonate. In term neonates, the birth asphyxia was the most common cause of neonatal seizures. The neonatal seizure are higher in low birth weight babies. The incidence of intra-ventricular hemorrhage (IVH) was significantly higher in preterm than term neonates. Out of biochemical abnormalities, the hypocalcemia was the most common cause of the neonatal seizures. Common causes of neonatal deaths in our center were severe birth asphyxia, intra-ventricular hemorrhage (IVH), septicemia and meningitis.

**Conclusion:** Most of the causes of neonatal seizures are preventable by good perinatal care and early interventions while metabolic seizures need a sharp vigilance and early suspicion.

**Keywords:** Birth asphyxia, complications, Neonatal seizures, Preterm.

## INTRODUCTION

Seizures occur more frequently in the neonatal period than at any other time of life.

Estimates of the incidence of neonatal seizures vary according to case definition, method of ascertainment and definition of the neonatal period, and range from 1 to 5/1,000 live births. In neonates, the vast majority of seizures are symptomatic of underlying disorders, although primary epileptic disorders may also present in this age group. The occurrence of seizure may be the first clinical indication of neurologic disorder.

Developmental immaturity influences many aspects of diagnosis, management, and prognosis of seizures in the newborn: (i) Clinical seizure patterns in the neonate reflect the “reduced connectivity” in the neonatal brain, with prominence of focal ictal characteristics and rarity of generalized patterns of clinical seizures. (ii) The balance of excitatory and

inhibitory processes in the immature brain are weighted toward excitation with an excess of glutamatergic synapses over inhibitory (usually gamma-aminobutyric acid [GABA]-ergic) synapses. In fact, in some regions of the neonatal brain, GABA may temporarily act as an excitatory neurotransmitter via an alteration in chloride gradient and transportation in the immature brain. These developmental features may underlie the neonate's tendency to frequently recurrent seizures and may explain the poor efficacy of traditionally used GABA-ergic antiepileptic agents (phenobarbital, benzodiazepines). (iii) Systemic processes are also immature, leading to altered drug handling compared to older children. (iv) The immature brain may be more susceptible to developmental effect of anti convulsant medication.

## MATERIALS AND METHODS

Present study was hospital based prospective study conducted among 85 neonates of 0-28 days of age at a civil hospital ahmedabad for a period of 6month. Institutional Ethics Committee permission was obtained and informed consent was taken from parents of eligible neonates for the present study.

### Name & Address of Corresponding Author

Dr Nishant Kumar Rai  
3rd year resident,  
Department of Paediatrics,  
B. J. Medical College,  
Ahmedabad.

Neonates of 0-28 days of both sexes having presented with seizure to the hospital in the present study during the study period and willing to give consent were included.

Neonates with inclusion criteria were new born babies admitted to NICU with the age of 0 – 28 days who had documented seizure during hospital stay were enrolled in this study.

Neonates with exclusion were:

Seizure mimic;

Parents not willing to give consent for study.

Patient who took LAMA were excluded in this study.

The data was recorded in the pre- designed, pre-tested, semi structured questionnaire. The informant was either of parents or very close relative who could give the detailed history about the neonate's disease and specifically from mother in case of neonatal seizures i.e. age at onset of seizures, seizure activity with special emphasis on occurrence of 1st seizures, duration of seizures, number and type of seizures, associated autonomic changes, medications required to control seizures, response time to medications, and possible causes for determination of etiology. A detailed antenatal, natal and postnatal history was taken.

As per the semi structured questionnaire, data like investigations, management of the case details and the final outcome was recorded.

### **Neonatal seizure**

Abnormal paroxysmal, stereotypic clinical events that are initiated by hyper-synchronous activity of neurons in the brain. The neonatal seizures were classified according to Volpe's classification into subtle, multifocal, clonic, focal clonic, tonic and myoclonic.

All required investigations were carried out and recorded. The outcome was noted down.

## **RESULTS**

Out of 85 neonates, 31 (36.47%) were preterm while 54 (63.53%) were term neonates.

Out of 54 term neonates, 19 (35.18%) neonates had subtle seizures, 26 (48.14%) neonates had clonic seizures, 8 (14.81%) neonates had tonic seizures and 2 (1.85%) neonates had myoclonic seizures.

Out of 31 preterm neonates, 12 (38.71%) neonates had subtle seizures, 10 (32.26%) neonates had clonic seizures and 9 (29.03%) neonates had tonic seizures.

**Table 1: Type of Seizure**

Type of seizure	term (n= 54)	Preterm (n = 31)	P value
Subtle	19(35.18%)	12(38.71)	<0.0135
focal clonic	14(25.92)	07(22.58)	<0.0192
Multifocal clonic	12(22.22)	03(9.68)	<0.022
Tonic	08(14.81%)	09(29.03)	<0.029
Myoclonic	01(1.85%)	00	<0.039
Total	54(63.53%)	31(36.47%)	

Out of 54 (63.53%) term neonates, 24 (51.85%) neonates had birth asphyxia, 12 (22.22%) neonates had cns infection and IVH was seen in 01(1.85%) neonates and hypoglycemia in 8(14.81%) and 5 (9.26%) term neonates acute bilirubin encephalopathy. 3 (5.53) term neonates had hypocalcaemia while 1(1.86) had meningomyelocele.

Out of 31 (36.47%) preterm neonates, 10 (32.25%) neonates had birth asphyxia, 09 (29.03%) neonates had CNS infection and IVH was seen in 05 (16.13%) neonate and hypoglycemia in 07 (22.58%). 01 (0.176%) had hypocalcemia.

**Table 2: Etiology**

Etiology	Term (n=54)	Preterm(n=31)	P value
Birth asphyxia	24	9	<0.001
Pyomeningitis	12	09	<0.012
Intraventricular haemorrhage	01	05	<0.025
hypoglycemia	08	07	<0.019
acute bilirubin encephalopathy	05	00	<0.039
Hypocalcemia	3	1	<0.040
meningomyelocele	1	0	<0.061
Total	54	31	

Out of the total number of neonates 40 (47.05%) developed seizures within 24 hours, 14 (16.47%) neonate had seizures between 25-48 hours, 16(18.82%) neonates developed seizures between 2-7 days and 15 (11.96%) neonates developed seizures after 7 days.

**Table 3: Cause of Death**

Causes of death	No. of cases (n=21)	%
Birth asphyxia	14	48.27
Pyomeningitis	06	20.68
Hypoglycemia	03	10.3
Intraventricular haemorrhage	05	17.24
Acute bilirubin encephalopathy	01	3.44
Total	29/85	34.11
OUTCOME	term	Preterm
Discharge	42	14
Expired	12	17

The majority of seizures due to birth asphyxia were observed in first 48 hours life (early onset) while in infection, seizures were observed after 7 days of life (late onset). Among metabolic abnormalities hypoglycemia cases were within 1st to 7th day of life. So, most of the metabolic abnormalities were seen after 24 hours of life. Out of 85 neonates, 56 (65.88%) survived while 29 (34.11%) neonates died. The common cause of neonatal death was birth asphyxia 14 (48.27%).

## DISCUSSION

The overall incidence of neonatal seizure in present study was found to be 12.66%. Sandhu R et al studied 80 patients and his incidence was 14.2 %. In the present study, out of 85 cases, 60 (70.59%) were male and 25 (29.41%) were female neonates. The male to female ratio was 2.4:1 suggesting that the incidence of neonatal seizures was higher in male neonates than female neonates. The exact cause of this is not known. Similar result were also observed in study conducted by Holden, Aland Powel et al. Holden et al studied

227 neonates of which 157 (56.77 %) neonates were male and 120 (43.32%) neonates were female. Powel et al studied total of 24 cases of which 17(70.83%) were male neonates and 7 (29.16%) were female neonates.

In the present study, full term neonates were 54 (63.53%) and 31 (36.47%) neonates were preterm. The term neonates showed predominance for seizure activity. The possible higher incidence in term neonates can be explained by the fact that most of the neonates in this group were intrauterine growth retardation (IUGR). The incidence of birth asphyxia is higher in IUGR neonates; this might be a contributing factor for the high incidence of seizures in this group. Similar finding were also observed in the study conducted by Legido et al and Kumar et al. Leidigo et al studied 40 neonates out of which 28 (70%) were term neonates and 12 (30%) were preterm neonates and kumar et al studied 35 neonates, out of which 30 (85.71%) neonates were term neonates.

Of all the seizures in neonates, subtle seizure is the commonest in majority of the studies. In the present study among the term group, subtle seizures were found in 19 (35.1%) neonates followed by clonic seizures in 26 (48%) neonates which were the commonest type of seizures observed. Tonic seizures were seen in 8 (14.81%) neonates followed by myoclonic in 1 (1.85%) neonates. In preterm neonates the subtle seizures were found 12 (38.71%) neonates followed by clonic seizures in 10 (32.26%) neonate. Tonic seizures were observed in 9 (29.03%) neonates. Similar result were also shown by studies conducted by Ross et al and soni et al. Rose et al studies 118 neonates, out of which 48 (40.60%) neonates had subtle, 42(35.59%) neonates had clonic, 10(8.9%) had generalized tonic and 28 (27.78%) neonates had myoclonic type of seizure.

In the present study, out of 54 term neonates, 24(45.85%) neonates had birth asphyxia, 12 (22.22%) neonates had CNS infection, and 1 (1.85%) neonate had intra- ventricular hemorrhage followed by hypoglycemia in 8 (14.81%) neonates. Among 31 preterm neonates, 9 (30.25%) neonates had birth asphyxia, 9 (29.03%) neonates had cns infection. Intra- ventricular hemorrhage (IVH) was seen in 5 (16.13%) neonates followed by

hypoglycemia in 7 (22.58%) neonates followed by 01 (3.13%) had hypocalcemia.

In present study the birth asphyxia as a cause of seizures was seen in 28 (51.85%) term neonates and 10 (32.25%) preterm neonates. The similar result was also shown by Erikson studied 77 neonates seizures cases out of which 48% were due to birth asphyxia. leidgo et al studied 40 neonatal seizure cases out of which 35% were due to birth asphyxia. Twelve term neonates had cns infections, out of which 5 (9.26%) neonates had meningitis and 7 (12.96%) neonates had septicemia. In preterm group 6 (19.35%) neonates had septicemia and 3 (9.67%) neonate had meningitis. The diagnosis of septicemia was made on the basis of clinical signs and laboratory parameters. The comparative study are Takasande AM, et al out of 110 neonatal seizure cases out of which 28.2% were infectious origine. In the present study, 6 (7.05%) neonates had intra-ventricular hemorrhage out of which 1 (1.85%) neonate was term while 7 (22.58%) neonates were preterm. The incidence of intra-ventricular hemorrhage was higher in preterm neonates than term neonates. Peri-ventricular or intra-ventricular hemorrhage is the most common cause of intracranial bleeding and neurological damage in low birth weight and preterm neonates. the similar result were also shown by studies conducted by Takasande AM et al out of 110 neonatal seizure 7 (6.36%) neonates develop seizure due to IVH.

Hypoglycemia occurs in both term and preterm neonates and particularly in neonates of diabetic mother. In our present study, hypoglycemia as a cause of neonatal seizures was observed in 15 (17.64%) neonates, out of whom 8 (53.33%) neonates were term and 7 (46.66%) neonates were preterm. The similar result was also shown studies conducted by Legido A et al out of 40 neonatal seizure 9.5% due to hypoglycemia.

In the present study, out of total 85 neonatal seizure cases, 70 (82.35%) neonates had seizures within 7 days of life, mostly constituted by the birth asphyxia (early onset).

In present study 15 (17.6%) neonates had convulsions after 8 days of life, out of which 9 (60%) neonates had septicemia.

## CONCLUSION

The early recognition and treatment of neonatal seizures is essential for optimal management and satisfactory outcome, as seizures in neonatal period are associated with high mortality and morbidity. Most of the causes of neonatal seizures are preventable by good perinatal care and early interventions while metabolic seizures need a sharp vigilance and early suspicion

## REFERENCES

1. Nelson textbook of paediatrics 19th edition
2. Cloherty and Stark Manual of neonatal care
3. Volpe JJ. Neonatal Seizures. In: Volpe JJ, editor. Neurology of the new-born. 4th ed. Philadelphia: WB Saunders.
4. Scher MS. Controversies regarding the neonatal seizures recognition. Epileptic Disorder.
5. Mizrahi EM. Neonatal seizures and neonatal epileptic syndromes. Neurologic Clinics.
6. David P, Daryl C, Vivo D. The Nervous System. In: Rudolph Colin D. Abraham D. Rudolph, MargaretK. Hostellter, editors. 21st ed. New York: McGraw Hills.
7. Mizrahi EP, Kellway P. Characterization and classification of neonatal Seizures. Neurology.
8. Painter MJ. Neonatal Seizures. In: Swaiman KF, editor. Principle and practice of pediatric neurology.

**How to cite this article:** Gosai D, Shah B, Rai NK. Study of Clinicoetiological Corelation in Patient with Neonatal Seizure and Early Outcome. Ann. Int. Med. Den. Res. 2020; 6(1):PE01-PE04.

**Source of Support:** Nil, **Conflict of Interest:** None declared